

POLYCRYSTALLINE DIAMOND PARTIALLY DEPLETED OF CATALYZING MATERIAL

Abstract

A method for forming a superhard polycrystalline diamond or diamond-like element with greatly improved resistance to thermal degradation without loss of impact strength. Collectively called PCD elements, these elements are formed with a binder-catalyzing material in a high-temperature, high-pressure process. The PCD element has a plurality of partially bonded diamond or diamond-like crystals forming at least one continuous diamond matrix, and the interstices among the diamond crystals forming at least one continuous interstitial matrix containing a catalyzing material. The element has a working surface and a body, where a portion of the interstitial matrix in the body adjacent to the working surface is substantially free of the catalyzing material to a depth from the working surface, the remaining interstitial matrix contains the catalyzing material, causing a 950 degrees C temperature at the working surface to be less than 750 degrees C at the depth.